

# **An Introduction to STEEL-IT® Brand Coatings and Instructions For Their Proper Application**

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## **INTRODUCTION**

For over 40 years, STEEL-IT brand coatings have been used in a multitude of applications across diverse industries to provide superior protection against corrosion, chemicals, abrasion, flaking, temperature cycling, and other harsh conditions where many other coatings fail.

STEEL-IT is commonly used in:

- The Food Processing and Packaging Equipment Industry, where STEEL-IT is specified by Hershey's Chocolate, PepsiCo, General Mills, Kellogg's, and numerous meat and chicken processing facilities because of STEEL-IT's outstanding performance withstanding daily, high-pressure washdowns and cleanings with harsh detergents.
- The Off-Road, Desert Racing market where racing teams and racing car builders choose STEEL-IT to coat suspensions, chassis, and other metal parts because STEEL-IT survives the world's most punishing race courses. Many parts finish races practically untouched looking as though a fresh coat of STEEL-IT had just been applied.
- Architecture and Construction because of STEEL-IT's proven, long-lasting performance and modern, industrial look.
- Special applications in the aerospace, agricultural, mining, and other numerous industries.

This guide is intended both as a brief introduction to what distinguishes STEEL-IT brand coatings and as a resource for successfully working with and applying these coatings to realize their maximum performance.

## **STEEL-IT: WHAT IT IS AND HOW IT WORKS**

STEEL-IT achieves its superior level of performance by embedding custom-engineered 316L stainless steel micro flakes in various resins including polyurethane, epoxy, and silicone depending on the formulation and combining these with additional anti-corrosive compounds.

Under a microscope, STEEL-IT coatings show a neat horizontal layered alignment of tightly overlapping, pure 316L flakes that form a metallic barrier film near the coating's surface, once referred to as stainless steel armor.

This stainless steel shield makes materials coated with STEEL-IT nearly impervious to corrosion and corrosive elements while providing a durable finish that resists scratching and flaking even under the most challenging conditions.

## **WHAT'S SPECIAL ABOUT STEEL-IT PRIMERS**

It's important to note the critical role that STEEL-IT primers play in contributing to STEEL-IT brand coatings' performance.

Unlike the case with many primers in the marketplace, STEEL-IT primers are not designed to enhance adhesion to the substrate, but are, in their own right, high-performance anti-corrosion coatings that contain, in addition to anti-corrosive materials, the same 316L stainless steel flake used in STEEL-IT topcoats. Thus, STEEL-IT primers when paired with STEEL-IT topcoats provide the maximum protection against corrosion, chemicals, abrasion, impact, temperature cycling, and other harsh conditions.

The primer's key role is to protect the substrate should the coating get seriously scratched or gouged down to the bare metal. The exposed substrate will certainly rust. But the primer keeps the rust from propagating. When the exposed area is discovered, the repair will be relatively easy because only the exposed area will need to be cleaned of rust and recoated rather than having to remove perhaps a several square foot area of rust, and repair and recoat a much larger surface.

The rest of this document provides detailed instructions for how to properly apply three STEEL-IT Systems (i.e., primer and topcoat):

| STEEL-IT SYSTEM     | COMPRISED OF                               | PRACTICAL COVERAGE AT<br>3 MILS (75 MICRONS) DFT* |
|---------------------|--|---|
| • Polyurethane      | STEEL-IT 2203<br>Alkyd Primer              | 160 sq ft/gal<br>(15 sq m/gal)                    |
|                     | STEEL-IT 1002<br>Polyurethane Topcoat      | 120 sq ft/gal<br>(11 sq m/gal)                    |
| • Epoxy             | STEEL-IT 4210<br>Epoxy Primer              | 215 sq ft/gal<br>(20 sq m/gal)                    |
|                     | STEEL-IT 4907<br>Epoxy Topcoat             | 150 sq ft/gal<br>(13.9 sq m/gal)                  |
| • High Solids Epoxy | STEEL-IT 4220<br>High Solids Epoxy Primer  | 310 sq ft/gal<br>(29 sq m/gal)                    |
|                     | STEEL-IT 4908<br>High Solids Epoxy Topcoat | 285 sq ft/gal<br>(26.5 sq m/gal)                  |

\* Assumes 20% loss due to overspray and waste

## **PROPER APPLICATION**

It's often said in the coatings industry that roughly 85% of all paint failures are due to improper or insufficient surface preparation and application. That is, the cause of the failure most often has nothing to do with the coating itself.

### **SURFACE PREPARATION**

Proper surface preparation is key to the success of any coating job, whether the coating is STEEL-IT or another brand. First, metal surfaces should be clean and free of all greases, waxes, salts, rust, dirt, scale, old paint, etc. Next, it's best if the surface being coated can be grit-blasted. STEEL-IT coatings need a rough, "scarified" surface in order to have something to bite into to adhere properly. The surface once properly prepared should feel much like the surface of the striking area on a matchbox.

The degree of blasting and appropriate blasting specification depends on the particular STEEL-IT formulation being used.

- STEEL-IT Polyurethane System (STEEL-IT 2203 Alkyd Primer, STEEL-IT 1002 Polyurethane Topcoat):
  - o Grit blast to a 1.5 - 2.0 mils (0.0015" – 0.0020"; 38-50 microns) sharp angular cut profile per SSPC SP-6 (commercial blast).
- STEEL-IT Epoxy System (STEEL-IT 4210 Epoxy Primer, STEEL-IT 4907 Epoxy Topcoat):
  - o Grit blast to a 1.5 - 2.0 mils (0.0015" – 0.0020"; 38-50 microns) sharp angular cut profile per SSPC SP-6 (commercial blast).
- STEEL-IT High Solids Epoxy System (STEEL-IT 4220 High Solids Epoxy Primer, STEEL-IT 4908 High Solids Epoxy Topcoat):
  - o Grit blast to a 2.0 - 3.0 mils (0.002" – 0.003"; 50-75 microns) sharp angular cut profile per SSPC SP-10 (near white blast).
  - o Please note: High solids/high build systems require deep anchor patterns for proper adhesion.

If blasting is not an option, power sanding using #36 grit paper will achieve similar results in the cases of the Polyurethane System and Epoxy System. The High Solids Epoxy System, like any high solids system, is very unforgiving if the surface preparation falls short of being perfect or nearly perfect. Thus, with High Solids, grit-blasting is strongly recommended.

Another surface preparation option for the Polyurethane System and Epoxy System is the Monti Bristle Blaster, a power tool that also achieves the proper surface conditions for the successful application of the STEEL-IT brand coatings mentioned. Stainless Steel Coatings, Inc. has no affiliation with Monti; it is merely an available option in the marketplace. For more information, visit: <http://www.monti.de/en/products/bristle-blaster>

#### ***REQUIRED AMBIENT CONDITIONS***

For the STEEL-IT Polyurethane, Epoxy, and High Solids Epoxy Systems:

- Apply only when ambient and substrate surface temperatures are between 50° F (10° C) and 100° F (38° C)
- Relative humidity is less than 85%
- Substrate surface temperature and the temperature of the coating are at least 5° F (2.75° C) above the dew point.

#### ***SUFFICIENT AGITATION***

Before applying STEEL-IT, it is critical that the contents be sufficiently agitated for about five minutes. This can be accomplished using a mechanical paint shaker or a mechanically driven paddle, at the end of a drill, for example. Hand stirring using a wooden stick will not provide sufficient agitation to properly prepare STEEL-IT for application.

Unlike with other paints and coatings where agitation or stirring is required to assure the homogeneity of the can's contents, in the case of STEEL-IT, agitation plays the critical role of adding enough energy into the coating to break temporary chemical bonds that have formed and thickened the coating as it's sat in the can. Adding energy makes the can's contents less viscous thus eliminating the need for thinners and readying STEEL-IT for application.

If agitated properly, STEEL-IT coatings should not require thinning with solvents before use and, in fact, adding solvents is discouraged since they alter the chemistry of STEEL-IT coatings and may negatively affect the coating's proper drying and curing processes.

### FILM THICKNESS

Finally it's important to say a word about the amount of STEEL-IT that should be applied. Typically we recommend one coat of primer at 3 mils (0.003"; 75 microns) dry film thickness (DFT), and one coat of topcoat also at 3 mils (0.003"; 75 microns) DFT. A second coat at 3 mils (0.003"; 75 microns) DFT of topcoat can be applied in situations that where conditions are particularly harsh due to chemical- or abrasion-exposure, as examples.

In order to achieve 3 mils (0.003"; 75 microns) DFT of various STEEL-IT brand coatings, the following wet film thicknesses (WFT) should be applied:

### Required Wet Film Thicknesses

#### Polyurethane System

| COATING                               | NUMBER OF MILS (MICRONS)<br>TO APPLY WET TO GET 3 MILS<br>(75 MICRONS) DRY |
|---------------------------------------|--|
| • STEEL-IT 2203 Alkyd Primer          | 8 mils (0.008"; 200 microns)   |
| • STEEL-IT 1002 Polyurethane Topcoat  | 11 mils (0.011"; 275 microns)  |
| • STEEL-IT 1002B Polyurethane Aerosol | 16 mils (0.016"; 400 microns)  |

#### Epoxy System

| COATING                       | NUMBER OF MILS (MICRONS)<br>TO APPLY WET TO GET 3 MILS<br>(75 MICRONS) DRY |
|-------------------------------|--|
| • STEEL-IT 4210 Epoxy Primer  | 6 mils (0.006"; 150 microns)   |
| • STEEL-IT 4907 Epoxy Topcoat | 9 mils (0.009"; 225 microns)   |

#### High Solids Epoxy System

| COATING                                   | NUMBER OF MILS (MICRONS)<br>TO APPLY WET TO GET 3 MILS<br>(75 MICRONS) DRY |
|---|--|
| • STEEL-IT 4220 High Solids Epoxy Primer  | 4.5 mils (0.0045"; 113 microns)  |
| • STEEL-IT 4908 High Solids Epoxy Topcoat | 4.5 mils (0.0045"; 113 microns)  |

Note: Please see *Recommended Spray Equipment and Settings to Use With STEEL-IT Brand Coatings*.

### **PROPERLY MEASURING STEEL-IT COATINGS' FILM THICKNESS**

There's one more important point about film thickness and STEEL-IT, and that concerns how to measure it. The amount applied should be measured when the coating is wet using a wet film thickness gauge, which is a very simple tool. A useful demonstration of how to use such a gauge can be found on YouTube: <http://www.youtube.com/watch?v=DtmEBBzlWQc>.

When using STEEL-IT brand coatings, most electronic gauges used to measure dry film thickness can give seriously inaccurate results.

That's because such gauges try to locate the substrate, and then measure the distance from the tool to the substrate and conclude that that is the thickness of the coating. However, because of the abundance of stainless steel in STEEL-IT coatings and the fact that they form a barrier coat of stainless steel near the surface of the coating, most electronic gauges often misinterpret this barrier coat as the substrate and report too little coating has been applied.

### **Electronic Gauges That Correctly Measure STEEL-IT's DFT**

After working with STEEL-IT brand coatings, two leading electronic dry film thickness gauge companies – Defelsko Instruments and Imaginant/PELT – have determined that the following models accurately measure STEEL-IT coatings' DFT:

#### Defelsko Instruments

1. PosiTector 6000 F1
2. PosiTest FM mechanical (magnetic principle) coating thickness gauge,
3. PosiTest DFT ferrous (magnetic principle) electronic instrument

#### Imaginant/PELT

1.  $\mu$ Pts3H Pelt ultrasonic film thickness gauge, coupled with a PELT-XER-M100 transducer and FC-U1STU40 wearcap

Both manufacturers recommend that if customers have difficulty reading STEEL-IT brand coatings thicknesses, that the customer contact them directly for guidance.

## DRYING TIME AND RECOAT WINDOWS

- **Polyurethane System**

STEEL-IT 2203 Alkyd Primer

- Tack free to handle: 1 hour
- Dry to recoat window: 6-24 hours
- If product is not topcoated within 24 hours, a light scuff-sanding using #200 grit paper is required before topcoating.

STEEL-IT 1002 Polyurethane Topcoat; STEEL-IT 1002B

Polyurethane Aerosol

- Tack free to handle: 2 hours
- Dry to recoat window: 6-24 hours
- Light duty use: 36 hours
- In cases when a second topcoat will be applied, if product is not topcoated within 24 hours, a light scuff-sanding using #200 grit paper is required before topcoating. Full cure for maximum hardness and protection will continue for 5-10 days.

- **Epoxy System**

STEEL-IT 4210 Epoxy Primer

- Dry to touch: 2 hours
- Tack free to handle: 12 hours
- Dry to recoat window: 12-24 hours
- If product is not topcoated within 24 hours, a light scuff-sanding using #200 grit paper is required before topcoating.

STEEL-IT 4907 Epoxy Topcoat

- Dry to touch: 2 hours
- Tack free to handle: 12 hours
- Dry to recoat window: 12-24 hours
- Light duty use: 36 hours
- In cases when a second topcoat will be applied, subsequent coats will be dry to handle in 24 hours. If product is not topcoated within 24 hours, a light scuff-sanding using #200 grit paper is required before topcoating. The coating's hardness and chemical resistance increase at an accelerated pace initially, then more slowly, attaining near maximum values after two weeks.

- **High Solids Epoxy System**

STEEL-IT 4220 High Solids Epoxy Primer

- Dry to touch: 3 hours
- Tack free to handle: 8 hours
- Dry to recoat window: 12-24 hours
- If product is not topcoated within 24 hours, a light scuff-sanding using #200 grit paper is required before topcoating. The coating's hardness and chemical resistance increase at an accelerated pace initially, then more slowly, attaining near maximum values after two weeks.

STEEL-IT 4908 High Solids Epoxy Topcoat

- Dry to touch: 4 hours
- Tack free to handle: 12 hours
- Dry to recoat window: 12-24 hours
- If product is not topcoated within 24 hours, a light scuff-sanding using #200 grit paper is required before topcoating. The coating's hardness and chemical resistance increase at an accelerated pace initially, then more slowly, attaining near maximum values after two weeks.

## THINNING AND CLEANUP

### Thinning

As explained above in the section *Sufficient Agitation*, it is unnecessary to use thinners when working with STEEL-IT brand coatings. Unlike the case with other paints and coatings, power agitation of STEEL-IT while it's still in the can – that is, adding sufficient energy to break short-term chemical bonds that have formed and thickened the coating – is the way to thin STEEL-IT and prepare it for spraying or other form of application.

### Cleanup

To clean spray guns and other application equipment, the following solvents should be used:

#### **Solvents to use to cleanup application equipment**

| STEEL-IT SYSTEM SOLVENTS FOR CLEANUP |   |
|--------------------------------------|---|
| • Polyurethane                       | Mineral spirits or xylene   |
| • Epoxy                              | 6811 Epoxy Reducer*; or use aromatic, glycol ether-based solvents |
| • High Solids Epoxy                  | 6811 Epoxy Reducer*; or use aromatic, glycol ether-based solvents |

\* Manufactured by Stainless Steel Coatings, Inc., the makers of STEEL-IT brand coatings.